

REMARKS

Claims 1-6 are pending in this application.

Rejection of Claims 1-6 under 35 USC § 103(a)

Claims 1, 2, 4 and 5 are rejected under 35 U.S.C. 103(a) as being un-patentable over Launey et al. (U.S. Patent No. 5,086,385) in view of Matsuo (U.S. Patent No. 6,317,501) and further in view of Thrift et al. (U.S. Patent No. 6,188,985).

The present invention is a voice control system for consumer electronic devices. The system includes one or more external loudspeakers and a microphone array. The microphone array includes a plurality of microphones used to convert a detected signal into an electrical signal, wherein one or more microphones are integrated into external loudspeakers. A central signal processing unit is connected to the plurality of microphones. The signal processing unit scales or processes the electrical signals received from the plurality of microphones according to the respective position of the microphones relative to the user. The respective position of the user is given by different measurements of propagation delays. A central speech recognition unit is used to convert the electrical signals from the signal processing unit into operational commands for the consumer electronics device.

The present invention is concerned with the directivity and thus the effectiveness and quality, of a microphone array implemented for voice input to a consumer electronics device by locating single external elements to be controlled. The microphone array for this system can be integrated into a myriad of external devices, such as loudspeaker boxes.

The term "microphone array", as claimed in claim 1 and when taken with the present specification refers to a plurality of single microphones (as seen in Figure 1 with the use of a microphone in each speaker, and page 2 lines 15-16 and 25-27), and

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that the output signals of the plurality of microphones are combined using known signal processing methods, e.g. propagation delay compensation, adaptive amplification and the like. This interpretation of the term complies with Fig.1 and has been accepted by the Examiner. However none of the prior art references cited disclose or suggest that single microphones located in different devices are connected to a single signal processing unit such that a microphone array is formed as in the present claimed invention. In addition, none of the prior art documents cited disclose or suggest multiple microphones used in an array where each microphone is processed individually and contributes to a signal which acts as one single microphone as in the present claimed invention.

Specifically, claim 1 recites:

“a plurality of microphones for converting a detected signal to electrical signals, wherein one or more microphones are integrated in said external loudspeakers;
a central signal processing unit being connected to the plurality of microphones, the signal processing unit scaling or processing the electrical signals received from the plurality of microphones according to the respective position of the microphones relative to the user, the respective position being given by different propagation delays; and
a central speech recognition unit for converting the electrical signals from said signal processing unit into operational commands for the consumer electronics device.”

The output of the signal processing unit of the present claimed invention is sent to the central speech recognition unit, which extracts words, identifies user commands and transforms them into operational commands for control of the device. With regards to this limitation, the Examiner’s argumentation is not consistent with that of the previous office action.

In the preceding Action (dated 12/05/2003) the Examiner argued that Launey et al. teach “a central signal processing unit (10) connected to the plurality of microphones, the signal processing unit processing the electrical output signals [...]”,

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and further “a central speech recognition unit (58) for converting the electrical signals from the signal processing unit into operational commands”. However, in the present office action the Examiner argues that Launey et al. teach “a central signal processing unit (58) connected to the plurality of microphones for processing signals retrieved from the microphones”, and further “a central processing unit (10) for converting the electrical signals from the signal processing unit (58) into operational commands”.

Applicant cannot deny that a speech processor performs a kind of signal processing, but the central processing unit (10) of Launey et al clearly does not perform speech recognition, in the common understanding as described above and as claimed in claim 1 of the present claimed invention.

Additionally, the speech processor (58) of Launey et al cannot combine raw signals from a plurality of microphones, as it explicitly consists of “one or more TISPEECH speech processing boards”, where “each TISPEECH board is connected to a **single** Crown PZM microphone” (see Col.13, Lines 19-28).

Conversely, the microphone array of the present claimed invention operates logically as a single microphone while treating the output signals of the single microphones individually, but **exceeds the dimensions of a single device**. Particularly, the purpose of the microphone array is that the outputs of **all** connected microphones are delay compensated and superposed in order to extract the portions of audio signals that they all receive in common. The system of Launey et al, tries to select the one microphone that is nearest to the user, since it uses multiple voice recognition locations when “different types of devices in different parts of the home” shall be controlled (see Col.15, Lines 13-18 and 37-41). However, the present claimed invention has a single voice recognition location. The fact that Launey et al. show in Fig.1 “remote microphones” connected to a speech processor is a contradiction to the statement that “each TISPEECH board is connected to a single Crown PZM microphone for voice pickup, shown as remote microphone 64” (col.13, lines 19-28 and col.15, lines 40-41). There is no teaching in Launey et al that a TISPEECH board, if it may have more than one microphone connected, is able to process the output signals of these microphones

individually. Rather, Launey et al appears to teach that a plurality of microphones may be connected in parallel or serially to the same input port, which does not correlate the single signals and thus does not constitute a microphone array. Thus, Launey et al neither disclose nor suggest **first** having centralized signal processing for all connected microphones **and then** centralized speech recognition as in the present claimed invention.

In addition, the system of Launey et al. tries to establish for the microphone a **small** distance to the speaker. In contrast, the present claimed invention establishes a **great** distance to the speaker.

Furthermore, the present claimed invention is a useful configuration for controlling a **single** consumer electronics device from a user being at a **specific point or area in a specific room**. Launey et al. aim at controlling a home network spread over different rooms **from different points**.

Matsuo discloses a microphone array apparatus to suppress noise, detect the position of and emphasize a sound source. The apparatus includes a plurality of microphones, filters for receiving the outputs of the microphones and a filter coefficient calculator. As admitted by the Examiner, Matsuo neither discloses nor suggests “a plurality of microphones wherein one or more microphones are integrated in said external loudspeakers” as in the present claimed invention. Additionally, Matsuo neither discloses nor suggests “a central speech recognition unit for converting the electrical signals from said signal processing unit into operational commands for the consumer electronics device” as in the present claimed invention. Matsuo is only concerned with reproducing the sound captured by the microphone.

Thrift et al cites a voice-activated device for controlling a processor based system. Thrift et al. includes a hand held device for wirelessly transmitting a control signal to a host system. Thrift et al. disclose that a microphone array may be used to enhance the ability of differentiating between the user's voice and other sounds. However, the microphones forming the microphone array are all contained within the

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hand held device and thus, Thrift et al. neither disclose nor suggest “a central signal processing unit being connected to the plurality of microphones, the signal processing unit scaling or processing the electrical signals received from the plurality of microphones according to the respective position of the microphones relative to the user, the respective position being given by different propagation delays” as in the present claimed invention. As the microphones of the microphone array are included in a handheld remote device, Thrift et al. would have no reason to consider the respective positions of the microphones relative to the user based upon different propagation delays as in the present claimed invention. The purpose of the microphone arrays of Thrift et al. is very different than the microphone array of the present claimed invention. The microphone array of Thrift et al. is to minimize interference. As the present invention includes a microphone array covering a wide area, the purpose is to ensure capturing of the voice signals from the user and determine the position of the user. As the user is holding the microphone array in the system of Thrift et al., there is no need to ensure capturing of the voice signals from the user as the user speaks into the microphone array nor is there any reason to determine the position of the user with respect to the position of the microphones of the array.

In view of the above remarks it is respectfully submitted that Launey et al., Matsuo and Thrift et al., when taken alone or in any combination would not make the present claimed invention unpatentable. Thus, it is further respectfully submitted that this rejection is satisfied and should be withdrawn.

Rejection of claim 3 under 35 U.S.C. 103(a)

Claim 3 is rejected under 35 U.S.C. 103(a) as being un-patentable over Launey et al. (U.S. Patent No. 5,086,385) in view of Matsuo (U.S. Patent No. 6,317,501) in view of Thrift et al. (U.S. Patent No. 6,188,985) and further in view of Lea (U.S. Patent No. 6,349,352).

The system of Lea represents a home audio/video network which utilizes multiple devices for communication purposes. In this system each new device is coupled to another device allowing use of its functions.

In figure 1A, all communications must be sent via another device, therefore not allowing any system component to work independently. However, in the present claimed invention each microphone acts independently, able to work autonomously towards the system without the system relying on any another microphone.

In figure 1B all the devices are connected directly to the set top box. This allows for communications to all devices using the set top box as a hub thus creating one large communications system. The system of Lea takes **individual** devices with **different** specific uses and joins them to form a communications network. In the present claimed invention each microphone has **identical** functionality and has the **identical** use.

The purpose of Lea's invention is to **broaden** the multitude of functions available, but in no way enhance any specific function. In contrast, the present claimed invention does not add to the functions available but, rather it **enhances** the function of a microphone by utilizing an array of microphones in its place.

Furthermore, Lea neither discloses nor suggests "a plurality of microphones for converting a detected signal to electrical signals, wherein one or more microphones are integrated in said external loudspeakers;" as in the present claimed invention.

In view of the above remarks it is respectfully submitted that Lea adds nothing when taken alone or in any combination with Launey et al., Matsuo and Thrift et al. that would make the present claimed invention unpatentable. Thus, it is further respectfully submitted that this rejection is satisfied and should be withdrawn.

Claim 6 is rejected under 35 U.S.C. 103(a) as being un-patentable over Launey et al. (U.S. Patent No. 5,086,385) in view of Matsuo (U.S. Patent No. 6,317,501) in view of Thrift et al. (U.S. Patent No. 6,188,985) and further in view of Abe et al. (U.S. Patent No. 5,218,641).

Abe et al discloses the use of wireless speakers through infra-red radiation modulated by an audio signal. While Abe et al. teach of alternate uses to conventional speakers Abe et al. do not cover the scope of the present claimed invention. The present claimed invention makes use of an array of microphones to enhance the quality of a microphone system. Further, in the present claimed invention, the signal from each individual microphone is individually processed to provide its own contribution to a system which acts as a single microphone. Similarly to Launey et al., Matsuo and Thrift et al., Abe et al. neither disclose nor suggest "a central signal processing unit being connected to the plurality of microphones, the signal processing unit scaling or processing the electrical signals received from the plurality of microphones according to the respective position of the microphones relative to the user, the respective position being given by different propagation delays" as in the present claimed invention.

In view of the above remarks it is respectfully submitted that Abe et al. add nothing when taken alone or in any combination with Launey et al., Matsuo and Thrift et al. that would make the present claimed invention unpatentable. Thus, it is further respectfully submitted that this rejection is satisfied and should be withdrawn.

Having fully addressed the Examiner's rejections, it is believed that, in view of the preceding amendments and remarks, this application stands in condition for allowance. Accordingly then, reconsideration and allowance are respectfully solicited. If, however, the Examiner is of the opinion that such action cannot be taken, the Examiner is invited to contact the applicant's attorney at the phone number below, so that a mutually convenient date and time for a telephonic interview may be scheduled.

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No fee is believed due. However, if a fee is due, please charge the additional fee to Deposit Account 07-0832.

Respectfully submitted,
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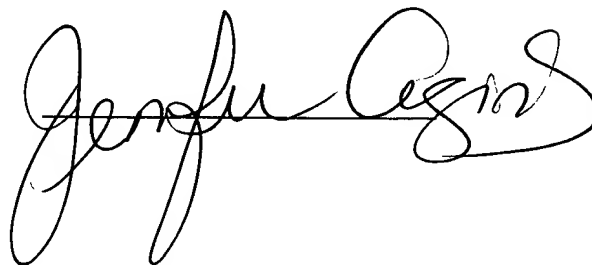
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A handwritten signature in black ink, appearing to read "Jennifer Agn", written over a horizontal line.